

# **SR 162 Puyallup River Bridge 162/006 Replacement**



## **Biological Assessment**

August 18, 2009



**Washington State  
Department of Transportation**



## EXECUTIVE SUMMARY

The Washington State Department of Transportation (WSDOT) proposes to replace a bridge located on State Route (SR) 162 from milepost (MP) 6.63 to 7.06. The bridge is a concrete-truss bridge and was built in 1934. The project is located in Pierce County, approximately 1.2 miles north of Orting, and 4.5 miles south of Sumner, Washington. SR 162 crosses the Puyallup River at approximate rivermile (RM) 18.1. The purpose of the project is to replace the existing bridge which has reached its useful life and has been deemed structurally deficient and functionally obsolete. Project activities will include partial roadway realignment, grading, new bridge construction, retaining walls, drainage construction, paving, striping, temporary shoring, a demolition containment system, demolition of existing bridge, removal of creosote treated piles, restoration and revegetation of the historical alignment.

The proposed project does not include funding from the Federal Highway Administration (FHWA), but does require a permit from the Army Corps of Engineers (ACOE). WSDOT is a designated non-federal representative for the ACOE; therefore, this Biological Assessment (BA), along with a formal request for concurrence, fulfills the obligations of the federal agency to initiate formal consultation under Section 7(c) of the Endangered Species Act (ESA). The WSDOT Olympic Region is submitting this BA.

The action area consists of two distinct types of project effects, noise and aquatic impacts. The primary noise impacts of the proposed activities include (i.e. grader, compactors, excavators, large trucks, etc.). The secondary noise impacts will be from the concrete shears for demolition. Primary and secondary project related noise is estimated at 91 and 98 dBA respectively. Traffic noise is estimated at 73 dBA. The extent of primary project related noise is estimated at approximately 3200 feet (0.6 mile). The extent of secondary project related noise is estimated at approximately 15,000 feet (2.84 miles). The disturbance area for aquatic species addressed in this report will be 100 feet upstream and 300 feet downstream of the SR 162 Puyallup River Bridge. The upstream action area limits are defined by the in-water noise impacts from concrete pier/rubble removal and the downstream limits are defined by sediment and turbidity effects that will occur due to the removal of the concrete rubble/pier.

This BA includes a risk assessment of project activities to Puget Sound Chinook, Puget Sound steelhead, coastal/Puget Sound bull trout, and Pacific eulachon. Critical habitat for Puget Sound Chinook and coastal/Puget Sound bull trout are also addressed. In order to avoid and minimize impacts to the environment and listed species, several minimization measures will be incorporated into project activities. We are expecting that an aquabarrier will be installed to constrict the river channel in order to construct a demolition containment structure beneath the existing bridge. The demolition containment structure will minimize if not completely avoid any demolition debris from entering the Puyallup River. In addition, the concrete bridge pier, rubble from the bridge built prior to the existing bridge, and creosote treated piles will be removed from the river. To minimize the effects of sedimentation and turbidity, a turbidity curtain will be installed around the perimeter of the southern pier and concrete rubble area. The SR 162 Puyallup River Bridge project was also designed to avoid any wetland impacts. In addition, an in-water work window, of July 15 to August 31 will be implemented. There will be an overall reduction of impervious surface within the project limits of 16,940 square feet (0.39 acres).

Based on the effects and exposure analyses and implementation of all Best Management Practices (BMPs), WSDOT has determined that the project activities, as proposed, warrants an effect determination of “*may affect, likely to adversely affect*” for Puget Sound Chinook, Puget Sound steelhead, and coastal/Puget Sound bull trout. The project activities as proposed warrant an effect determination of “*may affect, likely to adversely affect*” for Puget Sound Chinook and coastal/Puget Sound bull trout designated critical habitat. In addition, the project “*is not likely to jeopardize the continued existence*” of the Pacific eulachon. However, if Pacific eulachon becomes listed prior to completion of the project, a provisional effect determination of “*may affect, not likely to adversely affect*” is warranted.

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# 1. INTRODUCTION

The Washington State Department of Transportation (WSDOT) proposes to replace a concrete-truss bridge located on State Route (SR) 162 from milepost (MP) 6.63 to 7.06. The purpose of the project is to replace the existing bridge which has reached its useful life and has been deemed structurally deficient and functionally obsolete. Project activities will include partial roadway realignment, grading, new bridge construction, retaining walls, drainage, paving, striping, temporary shoring, construct demolition containment system, demolition of existing bridge, restoration, and revegetation of the historical alignment.

The project is located in Pierce County, approximately 1.2 miles north of Orting, and 4.5 miles south of Sumner, Washington (Sec. 13 T19N R4E W.M.) (Figure 1 [vicinity map]). SR 162 crosses the Puyallup River at approximate rivermile (RM) 18.1. SR 162 is a two lane asphalt roadway that serves as the primary route between the City of Tacoma and the smaller rural communities within the Puyallup River valley. The Puyallup River is within the Puyallup-White Water Resource Inventory Area (WRIA) 10) and Hydraulic Unit Code 171100140403.

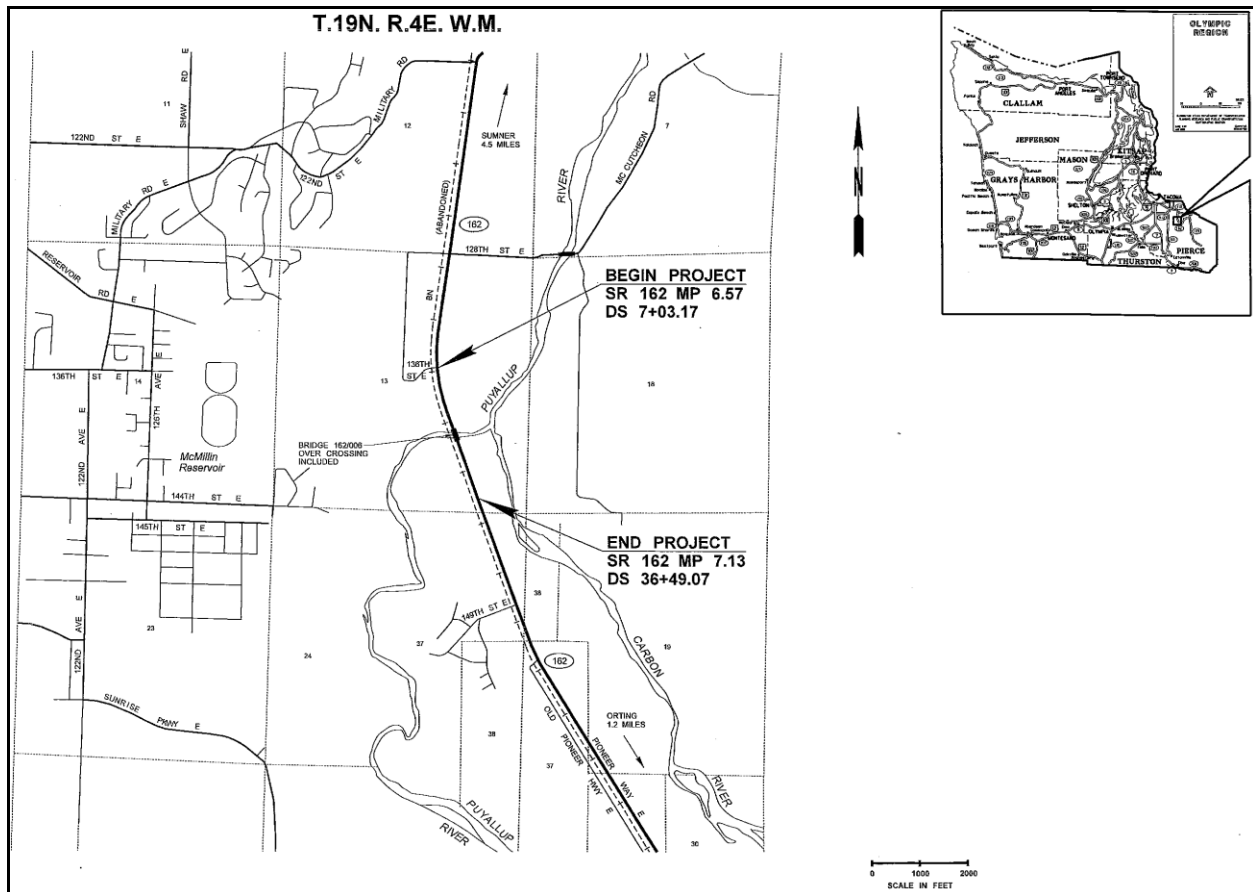


Figure 1: Vicinity Map

The Puyallup River Bridge 162/6 is a concrete truss/concrete T-beam structure. It was last inspected on May 15, 2007 and was recorded as structurally deficient and has reached the end of its service life. The WSDOT Olympic Region is proposing to replace the bridge with a wider concrete bridge. The new bridge will be a pre-stressed concrete girder structure, which will be

approximately 270-feet long and 40-feet wide. It will consist of two, 11-foot wide lanes with 9-foot shoulders on each side. The bridge includes placing four drilled-shafts, of which none will be within the ordinary high water level (OHWL) of the Puyallup River. Short segments of SR 162 will be realigned to match up with the alignment of the new bridge.

The existing bridge is a 210-feet long and 38-feet wide clear-span bridge. This includes two 11-foot lanes and two pedestrian crossings within the trusses. There are no shoulders between the traffic lanes and trusses. The existing bridge also has one pier partially within the OHWL of the Puyallup River. Demolition of the existing bridge will likely require constriction of the Puyallup River utilizing an aquabarrier, temporary shoring under the existing bridge, and the construction of a temporary demolition containment platform. The temporary shoring and the demolition containment platform will be removed once the bridge demolition work is complete.

The project biologist obtained endangered species listings for Pierce County dated November 1, 2007 and July 1, 2009 from the U.S. Fish and Wildlife Service (USFWS) and National Oceanic and Atmospheric Administration; National Marine Fisheries Service (NMFS) websites, respectively, on June 9, 2009 (Appendix A [*species lists*]). The listings indicate the potential presence of coastal/Puget Sound bull trout (*Salvelinus confluentus*), Canada lynx (*Lynx canadensis*), Gray wolf, (*Canis lupus*), Grizzly bear (*Ursus arctos*), marbled murrelet (*Brachyramphus marmoratus*), northern spotted owl (*Strix occidentalis caurina*), marsh sandwort (*Arenaria paludicola*), golden paintbrush (*Castilleja levisecta*), water howellia (*Howellia aquatilis*), Puget Sound Chinook salmon (*Onchorhynchus tshawytscha*), Puget Sound steelhead (*O. mykiss*), and Pacific eulachon (*Thaleichthys pacificus*) (Table 1).

The listing also indicated that critical habitat has been designated in Pierce County for coastal/Puget Sound bull trout, marbled murrelet, northern spotted owl, and Puget Sound Chinook (Table 1). The Puyallup River is also Essential Fish Habitat (EFH) for the Pacific Salmon Fishery as defined by the Magnuson-Stevens Act of 1996. EFH is addressed in Appendix L.

**Table 1: Species and critical habitat protected under the Endangered Species Act in Pierce County.**

Species (Common Name)	Species (Latin Name)	Director	ESA Status
Bull Trout	<i>Salvelinus confluentus</i>	USFWS	Threatened
Canada Lynx	<i>Lynx canadensis</i>	USFWS	Endangered
Gray Wolf	<i>Canis lupis</i>	USFWS	Threatened
Grizzly Bear	<i>Ursus arctos</i>	USFWS	Threatened
Marbled Murrelet	<i>Brachyramphus marmoratus</i>	USFWS	Threatened
Northern Spotted Owl	<i>Strix occidentalis caurina</i>	USFWS	Threatened
Marsh Sandwort	<i>Arenaria paludicola</i>	USFWS	Endangered
Golden Paintbrush	<i>Castilleja levisecta</i>	USFWS	Endangered
Water Howellia	<i>Howellia aquatilis</i>	USFWS	Threatened
Puget Sound Chinook	<i>Onchorhynchus tshawytscha</i>	NOAA	Threatened
Puget Sound Steelhead	<i>Onchorhynchus mykiss</i>	NOAA	Threatened
Pacific Eulachon	<i>Thaleichthys pacificus</i>	NOAA	Proposed
Type of Habitat	Species (Common Name)	Director	ESA Status
Critical Habitat	Bull Trout	USFWS	Designated
Critical Habitat	Marbled Murrelet	USFWS	Designated
Critical Habitat	Northern Spotted Owl	USFWS	Designated
Critical Habitat	Puget Sound Chinook	NOAA	Designated

A WSDOT biologist conducted a field review of the project site on June 26, 2008 and March 3, 2009. The purpose of the site visit was to gain a thorough understanding of the proposed activities, evaluate the existing habitat of listed and proposed species in the action area, and identify potential project impacts on these species. Species under the USFWS and NMFS jurisdiction were further investigated by means of personal communications with local fish and wildlife authorities and review of pertinent literature, including information received from the WDFW priority habitats and species database (PHS 2009).

There are no known occurrences of Canada lynx, gray wolf, grizzly bear, marbled murrelet, northern spotted owl, marsh sandwort, golden paintbrush, or water howellia within the action area. In addition, suitable habitat for these species does not exist within the project area. These species and/or their critical habitat do not occur within the action area therefore, they will not be further addressed in this BA. Once all data had been analyzed, the biologist determined that only the species listed in Table 2 may potentially occur within the project action area. In addition, critical habitat has been designated for coastal/Puget Sound bull trout and Puget Sound Chinook.

**Table 2: Listed Species Potentially Present in the Project Area.**

Listed Species	Federal Status	Critical Habitat
Coastal/Puget Sound Bull Trout	Threatened	Yes
Puget Sound Chinook Salmon	Threatened	Yes
Puget Sound Steelhead Trout	Threatened	No
Pacific Eulachon	Proposed	No

## 1.1 CONSULTATION HISTORY

This project includes a U.S. Army Corps of Engineers (ACOE) permit, creating a federal nexus. Project proponents with a federal nexus are required to consult with the USFWS and the NMFS to evaluate potential impacts to species listed as threatened or endangered under the Endangered Species Act (ESA) of 1973. WSDOT prepared this Biological Assessment (BA) on behalf of the ACOE. Early coordination with the USFWS and NMFS took place during the preparation of this BA. A pre-BA meeting was conducted for this project on March, 19, 2009. Representatives from USFWS, NMFS, and project proponents (WSDOT Olympic Region staff) were present at the pre-BA meeting.

## 2. PROJECT DESCRIPTION

### 2.1 PROJECT SUMMARY

Realignment of SR 162 and staged construction will allow for virtually uninterrupted traffic and pedestrian patterns. Constructing the new bridge downstream of the existing SR 162 Puyallup River Bridge will avoid the need to build a temporary detour bridge and removal of the pedestrian only bridge, which was constructed on a historical railroad grade (Figure 2). Traffic flow will be maintained on the existing SR 162 bridge during construction. The realignment will require additional embankment on the northeast (Figure 3) and southeast quadrant (Figure 4) of the project area. Construction of the compost amended vegetative filter strips (CAVFS) will occur at the northwest quadrant (Figure 5) and along the project boundaries, respectively. The realignment and stormwater facilities will necessitate the removal of vegetation. The widening

of the highway will allow construction staging and equipment access with minimal impact to the existing SR 162 alignment. Short term lane closures may be required to make the final tie-in connection.



**Figure 2: Pedestrian only trail on historic railroad grade. This bridge is 50 ft. upstream of the existing bridge.**



**Figure 3: View south of northeast quadrant. Fill will be placed here.**



**Figure 4: View south of southeast quadrant. Embankment/realignment area, clearing and grubbing.**



**Figure 5: View north of northwest quadrant of project area.**

Construction activities will include:

- Clearing and grubbing;
- Construct new alignment (embankments, ditches, culverts);
- Stormwater treatment features;
- Build new bridge;
- Paving;
- Construct temporary shoring and demolition containment;
- Remove existing bridge and fill; and
- Re-plant and hydroseed disturbed areas (including old realignment area).

## **2.2 BRIDGE REPLACEMENT**

### **2.21 New Bridge Construction**

The proposed upgraded concrete bridge will be a two-span bridge approximately 270-feet long and 40-feet wide (Appendix B [*project plans*]). The new bridge will have two, 11-foot lanes with a 9-foot shoulder on both sides. This will allow the slopes under the bridge to be graded to tie-in with the slopes upstream and downstream of the new bridge. The intent is to not constrict the flow during high water events. The new bridge will be built with three drilled shafts. One drilled shaft at each abutment and one drilled shaft on the north side of the Puyallup River OHWL. There will be no piers below the OHWL. The construction of the abutments will require approximately 1,380 square feet (SF) (741 cubic yards [CY]) of excavation. The new alignment of SR 162 will necessitate the placement of 126,570 SF (17,585 CY) of permanent fill and 2,850 SF (1,525 CY) of temporary fill above the OHWL. Approximately half of this fill will be within the existing roadway prism. Pre-stressed girders will be precast by a permitted and approved fabricator, brought to the project site, and installed. Before any concrete casting takes place, false work and forms will be built. Once the concrete has cured the false work and forms will be removed. The footings, walls, deck, and barriers will be cast in place at the project site. No concrete will be allowed to enter the stream or adjacent wetlands. Mixer truck wash will be contained, cured, and disposed at an approved and permitted site.

### **2.22 Existing Bridge Demolition**

The design of the existing concrete truss/concrete T-beam bridge is one that constituted an exorbitant amount of concrete (Figure 6). The weight of the bridge will not allow for a simple crane pick for removal. In order to remove the existing bridge, the concrete will need to be crushed on site. To minimize the potential of debris entering the Puyallup River, a demolition containment structure (Appendix C [*demolition plan*]).

Construction of the temporary shoring and demolition containment structure will require the placement of large temporary spread footings 15.9 CY (285 SF) to support the containment structure. To minimize the size of the demolition containment structure required, an aquabarrier (Appendix D [*aquabarrier*]) will be placed from the upstream left bank out into the river to divert the majority of the flow into a much narrower path, which is the thalweg, through the project area. Chain link material and geotech fabric will be placed on the gravel bar. The

expectation is that once the bridge is supported from underneath with the use of large jacks, the concrete trusses will be demolished from the bridge deck. Once the trusses are demolished, it is expected that the bridge will then be cut into pieces and lowered with the jacks onto the leftbank gravel bar and the demolition containment structure. The majority of the remaining portion of the bridge will be demolished on the protected gravel bar of the leftbank, behind the aquabarrier. The other remaining portion of the bridge will be crushed on the demolition containment structure. In order to fill in voids created during removal of creosote treated piles and the existing bridge piers 0.52 CY (4.68 SF) and 135 CY (640 SF) of permanent fill will be placed below the OHWL.



**Figure 6: Heavy concrete truss/T-beam design.**

## **2.3 IN-WATER WORK**

The new bridge will be a pre-stressed concrete girder structure, which will be approximately 270-feet long and 40-feet wide. The bridge includes placing three drilled-shafts. There will be no bridge piers below the OHWL of the Puyallup River.

In order to remove the existing bridge, the concrete structure will need to be crushed on site. To minimize the potential of debris entering the Puyallup River, an aquabarrier (Appendix D [*aquabarrier*]) will be placed from the upstream left bank out into the river to divert the majority of the flow into a much narrow path, which is the thalweg, through the project area. Once the aquabarrier, the temporary containment system and series of temporary supports are installed, which are all below the OHWL, bridge demolition will be completed in the dry.

The intent of the aquabarrier is to basically dewater the area where the footing for the temporary containment structure will be located. The dewatering will necessitate removal of fish behind the aquabarrier. The aquabarrier will allow for gradual dewatering therefore supporting volitional fish removal. The project biologist will be on site during dewatering to relocate any stranded fish. In the event that more intensive fish handling is required, (seining or electrofishing), the WSDOT fish handling protocol will be adhered to (Appendix E [*WSDOT Fish Handling Protocol*]).

In addition to the existing south bridge pier, concrete rubble (168 CY) from the previous bridge pier will be removed. The area around the concrete piers/rubble will be isolated by enclosing the work area with a turbidity curtain (Appendix F [*turbidity curtain*]). The existing piers will be cut-off two feet below the ground level and the concrete rubble will be broken into manageable pieces in order to be lifted out with either a crane or large excavator.

## 2.4 CLEARING AND GRUBBING

Project activities will include 4.45 acres (7,180 CY) of clearing and grubbing. The majority of clearing and grubbing will occur on the southeast project quadrant (Figure 4). Random clearing and grubbing of ornamental trees along the decommissioned alignment will be cleared and grubbed throughout the project limits. Various shrub and herbaceous species within the project area consisting of salmonberry, Himalayan blackberry, sword fern and giant horsetail will also be removed. The riparian habitat of the Puyallup River is minimal and consists of dense shrub vegetation with scattered mature trees, including conifers and large cottonwood. The total number of trees to be cleared and grubbed and their diameter at breast height (DBH) are specified in Table 3. The larger trees will most likely be removed using a chain saw. Smaller trees and shrub vegetation will be removed with an excavator. Very few of the trees that will be removed are functioning as riparian habitat for the Puyallup River. Removal of trees within the riparian corridor of the Puyallup River will be limited to what is necessary to realign SR 162.

**Table 3: Proposed Tree Removal**

Tree Species	<12-inch DBH	12-24-inch DBH	24-36-inch DBH	>36-inch DBH
Big Leaf Maple	59	15	10	1
Cottonwood	0	1	8	1
Douglas Fir	5	8	1	1
Red Alder	101	7	1	0
Western Red Cedar	2	1	0	0

## 2.5 CONSTRUCTION EQUIPMENT

Potential construction equipment to be used may include:

- Crane;
- Boom truck;
- Excavator;
- Dozer;
- Dump truck;
- Compressor;
- Asphalt paver;
- Rollers;
- Front loader;
- Backhoe;
- Grader (blade);
- Concrete mixer truck;
- Generator;
- Bidwell concrete paver; and
- Miscellaneous power hand tools.

## 2.6 STORMWATER

There is currently 97,322 SF (2.23 acres) of impervious surface within the project area of which 32,552 SF (0.77 acres) will be replaced (Table 4). The new alignment and bridge surface will include 47,830 SF (1.10 acres) of net new impervious surface area. The post-project total impervious surface area will equal 80,382 SF (1.85 acres) for a reduction in impervious surface of 16,940 SF (0.39 acres).

The reduction in impervious surface is realized with the final drainage design. If an impervious surface such as a parking area, bike trail, or any impervious surface that a vehicle can access and is connected to and receiving runoff from a pollution generating Impervious surface (PGIS), that connected impervious surface is also considered a PGIS and must be included in the total existing PGIS area. This is the situation we have under the existing conditions. The project includes parking areas like this that are adjacent to and receiving runoff from the existing PGIS roadway. So they had to be included in the existing PGIS calculations. After the proposed roadway is constructed those previously connected impervious areas will be separated by a ditch and no longer receiving runoff from a PGIS. Therefore they are no longer included in the proposed PGIS areas, reducing the impervious surface area. In addition, the new stormwater system will infiltrate 100% of the runoff. The project was designed to the 2008 Highway Runoff Manual (HRM) (WSDOT 2008).

**Table 4: Existing and Built Out Impervious Surface**

<b>Impervious Surfaces</b>	<b>Area (square feet)</b>	<b>Area (acres)</b>
Existing impervious within project limits	97,322	2.32
Existing impervious replaced	33,552	0.77
Net new impervious surface	47,830	1.10
Built out impervious	80,382	1.85

### 2.6.1 Existing

There are four Threshold Determination Areas (TDAs) within the project limits, TDA A, B, C, and D (Appendix G [*ESA stormwater design checklist & TDA layout*]). The total area for these four TDAs is 5.71 acres of which 2.23 is considered to be impervious surface. The existing impervious area runoff receives very little treatment. Portions of the existing stormwater runoff outfalls directly into the Puyallup River.

TDA A – There is no defined conveyance system in TDA A. The terrain in TDA A is relatively flat with a high infiltration rate. All sheet flow from the roadway disperses and infiltrates into the surrounding area, all within WDOT right-of-way. Site observations indicated that there is no surface water flowing onto or leaving TDA A. A portion of TDA A is within the 100-year floodplain. There is 0.56 acres of impervious surface within TDA A.

TDA B – There is no defined conveyance system in TDA B. The terrain in TDA B is relatively flat with a high infiltration rate. All sheet flow from the roadway disperses and infiltrates into the surrounding area, all within WDOT right-of-way. Site observations indicated that there is no surface water flowing onto or leaving TDA B. There is a small resemblance of a ditch on the west side of the roadway, but due to the dense vegetation and virtually no grade, no runoff is

conveyed to this ditch. The ditch also contains what appears to be check dams, which further hinders conveyance and increases infiltration. There is 0.29 acres of impervious surface within TDA B.

TDA C – There is no defined conveyance system in TDA C. A small portion of TDA C has runoff that directly outfalls to the Puyallup River. This runoff enters the river from the bridge drains located on the existing bridge. Just north and west of the existing bridge a small portion of the runoff may sheet flow off the existing asphalt surface and flow down a walkway that extends down to the river bank. All other sheet flow in TDA C disperses and infiltrates into the surrounding terrain. Site observations indicate that there is no surface water flow into TDA C. There is 1.14 acres of impervious surface within TDA C.

TDA D – All runoff in TDA D sheet flows from the centerline off the asphalt pavement down the side slope into a 100-year floodplain area and disperses and infiltrates 100%. There is 0.24 acres of impervious surface area within TDA D.

## **2.6.2 Proposed**

The final design will also include four TDAs within the project limits, TDA A, TDA B, TDA C, and TDA D (Appendix G [*ESA stormwater design checklist & TDA layout*]). Post-project these four TDAs will encompass 5.21 acres of which 1.84 will be impervious surface. Post-project 100% of stormwater runoff within the project limits will be treated and infiltrated. There will be zero stormwater runoff outfalls into the Puyallup River. The project was designed to the 2008 Highway Runoff Manual (HRM) (WSDOT 2008).

TDA A – There will still be no stormwater conveyance system for TDA A. The roadway runoff will enter into compost amended vegetated filter strips (CAVFS) located two feet from the edge of the paved shoulder. After passing through the CAVFS the runoff will infiltrate 100%.

TDA B – The roadway runoff from the new bridge from station 19+13 to station 22+83 will be collected by two Type II grate inlets with the first inlet located 10 feet from the end of the bridge approach slab. From the grate inlets the runoff will be conveyed in an 18-inch diameter pipe to a Type II, 48-inch diameter catch basin and then daylight into a biofiltration swale at station 15+93. The runoff will continue through the biofiltration swale into a closed depression at the northwest end of the project and then infiltrate 100%.

Runoff north of the bridge and on the eastside of the roadway will be conveyed in Media Filter Drains (MFDs) located at the toe of the fill slope. At the low end of the sloped ditch, a 24-inch diameter concrete culvert will convey the runoff under the road into the biofiltration swale and then north to the closed depression and infiltrate 100%.

TDA C – Runoff will sheetflow into a MFD located two feet from the paved shoulder from station 22+83 to 24+41. An eight-inch perforated pipe will convey this section of runoff to an infiltration pond. From station 25+14 to 27+53 the MFD will be located at the toe of the fill slope. The MFD will run approximately from station 22+83 to station 27+53 where it will outfall into the infiltration pond.

TDA D – There is no stormwater conveyance system for TDA D. The roadway runoff will naturally disperse and infiltrate down the slope and into the surrounding vegetation. No runoff will outfall into the Puyallup. Stormwater will infiltrate 100%.

## **2.7 MINIMIZATION MEASURES**

1. Salmonid impacts will be minimized by obtaining a WDFW HPA and implementing all provisions including an in-water work window, which is expected to be July 15 to August 31.
2. Volitional fish relocation will occur. If more intense fish relocation efforts are required, the WSDOT Fish Handling Protocol will be adhered to.
3. In-water construction will take place when the stream flows within the dewatered area are low, possibly dry and listed fish are less likely to be present.
4. All instream depressions remaining on the gravel bar after removal of the temporary containment structure footings will be regraded to prevent fish entrapment.
5. No piers will be placed below the OHWL.
6. If there is a change in species status, or are any changes to the project that may impact listed species, consultation will be reinitiated.
7. Disturbance of the streambed and banks shall be limited to that necessary to dismantle the existing bridge and install the new bridge.
8. Approach material shall be structurally stable and composed of material that, if eroded into the stream, shall not be detrimental to fish life.
9. Standard erosion control and spill control BMPs will be fully implemented.
10. There will be no staging areas within wetlands.
11. Vegetated areas that are impacted during construction will be re-vegetated after construction is complete.

## **2.8 INTERRELATED AND INTERDEPENDENT ACTIONS**

The effects of actions that are interrelated to or interdependent with the proposed project must also be considered when defining the action area for the proposed project and considering the potential effects on listed species and habitats (WSDOT 2006a).

Interdependent actions are defined as those actions that have no independent utility apart from the proposed action. Interrelated actions are those actions that are a part of the proposed action and are dependent upon that action for their justification (WSDOT 2006a).

There are no planned or known interrelated or interdependent activities associated with the construction of the SR 162 Puyallup River Bridge replacement project, or the resulting operation of the bridge and roadway after the project is complete. Therefore, there will be no related effects on the physical, chemical, and biological environment.

## 2.9 PROJECT TIMING

The project duration is anticipated to be 13 months of construction, which will span two in-water work windows. Project activities are scheduled to occur during daylight hours. The project is currently scheduled for the 2011-2013 biennium. Equipment mobilization to the project area is scheduled to begin early July 2011 with the project ending late September 2012 (Appendix H [*project schedule*]). An in-water work window of July 15 to August 31 (Piazza, pers. comm., 2009) is expected for this project. All in-water work will be conducted within this window.

## 3. PROJECT AREA

The project area includes the immediate vicinity of the proposed construction. The project area will extend between MP 6.63 to MP 7.06 along SR 162. The project area will also include the portion of the Puyallup River channel extending approximately 50 ft. waterward of the existing SR 162 Puyallup River Bridge north abutment and 20 ft. waterward of the south abutment.

## 4. ACTION AREA

The action area is defined as all areas that are potentially affected, directly or indirectly, by the project and not merely the immediate area involved in the project. The action area is addressed as the three-dimensional extent of all chemical, physical, and biological effects of the action on the environment. The extent of the action area is shown in Figure 7.

For this biological assessment, the action area encompasses two zones: the terrestrial portion and the aquatic portion. The terrestrial portion, or the extent of terrestrial impacts, is defined by the following:

- Aerial noise produced by heavy equipment during transportation, staging, and construction (direct effect);
- Habitat disturbance at the construction site (direct effect); and
- Physical changes to bank structure and riparian habitat caused by geomorphic responses to the project, and related biological responses (indirect effects).

The aquatic portion, or the extent of aquatic impacts, is defined by the following:

- Habitat disturbance and alteration in the Puyallup River (direct effects);
- Localized and downstream turbidity produced by short-term pulses of construction-related sediment (direct effect);
- Underwater noise associated with construction (direct effect); and
- Improved water quality and river habitat conditions occurring as a result of removing concrete rubble and creosote-infused piles (indirect effect).

## **4.1 TERRESTRIAL IMPACT AREA:**

### **4.1.1 Primary Noise**

Primary noise generated from construction is the noise levels created by the equipment that is likely to be used for a majority of the project duration. The loudest piece of primary equipment is the grader, which at a distance of 50 feet, is estimated to be 89 dBA. The second piece of primary construction equipment is the compactor, which at 50 feet is estimated to be 83 dBA. The third piece of primary construction equipment is the excavator, which at 50 feet is estimated to be 81 dBA. Using the rules for decibel addition (WSDOT 2008) one dBA should be added to the noise level of the grader for the compactor and another decibel added for the excavator. Therefore the primary noise level for this construction activity can be expected not to exceed 91 dBA.

### **4.1.2 Secondary Noise**

Secondary noise generated from construction is the noise levels created by the equipment for a much shorter specific amount of time. The loudest secondary terrestrial noise source generated during construction will be from the concrete shear required for bridge demolition. At a distance of 50 feet, the noise of a concrete shear is estimated to be 96 dBA. The second piece of secondary construction equipment is the concrete saw, which at 50 feet is estimated to be 90 dBA. The third piece of secondary construction equipment is the hoe mounted ram, which at 50 feet is estimated to be 90 dBA. Using the rules for decibel addition (WSDOT 2008) one dBA should be added to the noise level of the concrete shear and another decibel added for the hoe mounted ram. Therefore the secondary noise level for bridge demolition can be expected not to exceed 98 dBA.

The project is located on SR1 62 in the vicinity of MP 7.0 in a moderately developed agricultural area. The speed limit in the project area is 55 mph, and current traffic levels will be elevated because of seasonal use and includes heavy truck traffic. The Annual Traffic Report lists the annual daily traffic (ADT) on SR 162 at between 18,000 and 20,000 vehicles per day. Therefore, vehicles per hour can be estimated as 10 percent of 19,000 or approximately 1900 vehicle per hour (vph). A roadway with 1900 vph at 55 miles per hour (mph) traffic speed has a baseline noise level of approximately 73 dBA (WSDOT 2008).

Based on the location of the project in a moderately developed agricultural setting, it can be assumed that soft site conditions exist. Therefore, it is necessary to add the additional 1.5 dBA reduction to the standard reduction factors.

All work on the project will occur at one location, and is considered point source noise. Therefore, adding the reduction for soft site conditions, construction noise will attenuate at a rate of 7.5 dBA per doubling of distance. Traffic noise (line source) will attenuate at a rate of 4.5 dBA per doubling of distance. This attenuation rate includes the 1.5 dBA reduction for soft site conditions (WSDOT 2008).

Primary and secondary project related noise is estimated at 91 and 98 dBA respectively. Traffic noise is estimated at 73 dBA. Table 5 was generated using the predicted construction and traffic noise levels and the attenuation rates for each. The extent of primary project related noise is estimated at approximately 3200 feet (0.6 mile). The extent of secondary project related noise is

estimated at approximately 15,000 feet (2.84 miles). At these distances, construction noise levels have attenuated to the same level as traffic noise. This does not factor in topographical relief, which will further limit the extent of noise travel. The extent of the action area is shown in Figure 7.

**Table 5: Terrestrial construction noise attenuation for the SR 162 River Bridge replacement project.**

<b>Distance from Roadway (ft)</b>	<b>Primary Construction Noise (-7.5 dBA)</b>	<b>Secondary Construction Noise (-7.5 dBA)</b>	<b>Traffic Noise (-4.5 dBA)</b>
50	91	98	73
100	83.5	90.5	68.5
200	76	83	64
400	68.5	75.5	59.5
800	61	68	55
1600	53.5	60.5	50.5
3200	46	53	46
6400	38.5	45.5	41.5
12800	31	38	37
25600	23.5	30.5	32.5

#### **4.2 IN-WATER IMPACT AREA:**

For the Puyallup River Bridge replacement project, the only significant source of underwater noise will be generated during removal of the concrete rubble adjacent to the south pier of the existing SR 162 Puyallup River Bridge. Underwater noise travels straight outward from the source until it encounters a river bend or another intervening landmass. Underwater noise does not refract around bends in river banks. In addition, underwater noise will propagate only when the water level is greater than three feet (WSDOT 2006). Due to summer river low flow, these conditions are expected to occur only during a fraction of the construction period and within a limited area of the project area. The channel is expected to be deepest along the rightbank within the thalweg (app. 3-4 feet), therefore in-water noise impacts will be concentrated within this area. The area outside of the thalweg is not of sufficient depth to propagate sound.

The underwater noise will determine the upstream limits of the in-water impact area. The upstream in-water impact area is determined to be 100 feet upstream. Downstream of the project area, the channel type is primarily glide except for within the thalweg. The depth within the thalweg is expected to be less than three feet deep within 100 feet downstream of the in-water work area. Therefore the depth is not sufficient to transmit noise from the removal of rubble beyond 100 feet downstream. Therefore, turbidity is likely to determine the downstream extent of in-water impacts. The Department of Ecology (DOE) water quality regulations dictate that the turbidity levels will not exceed five nephelometric units (NTUs) above the background turbidity level within 300 feet for a river the size of the Puyallup (> 100cfs). Therefore the downstream extent of the in-water impact area is determined to be 300 feet downstream of the existing SR 162 Puyallup River Bridge.

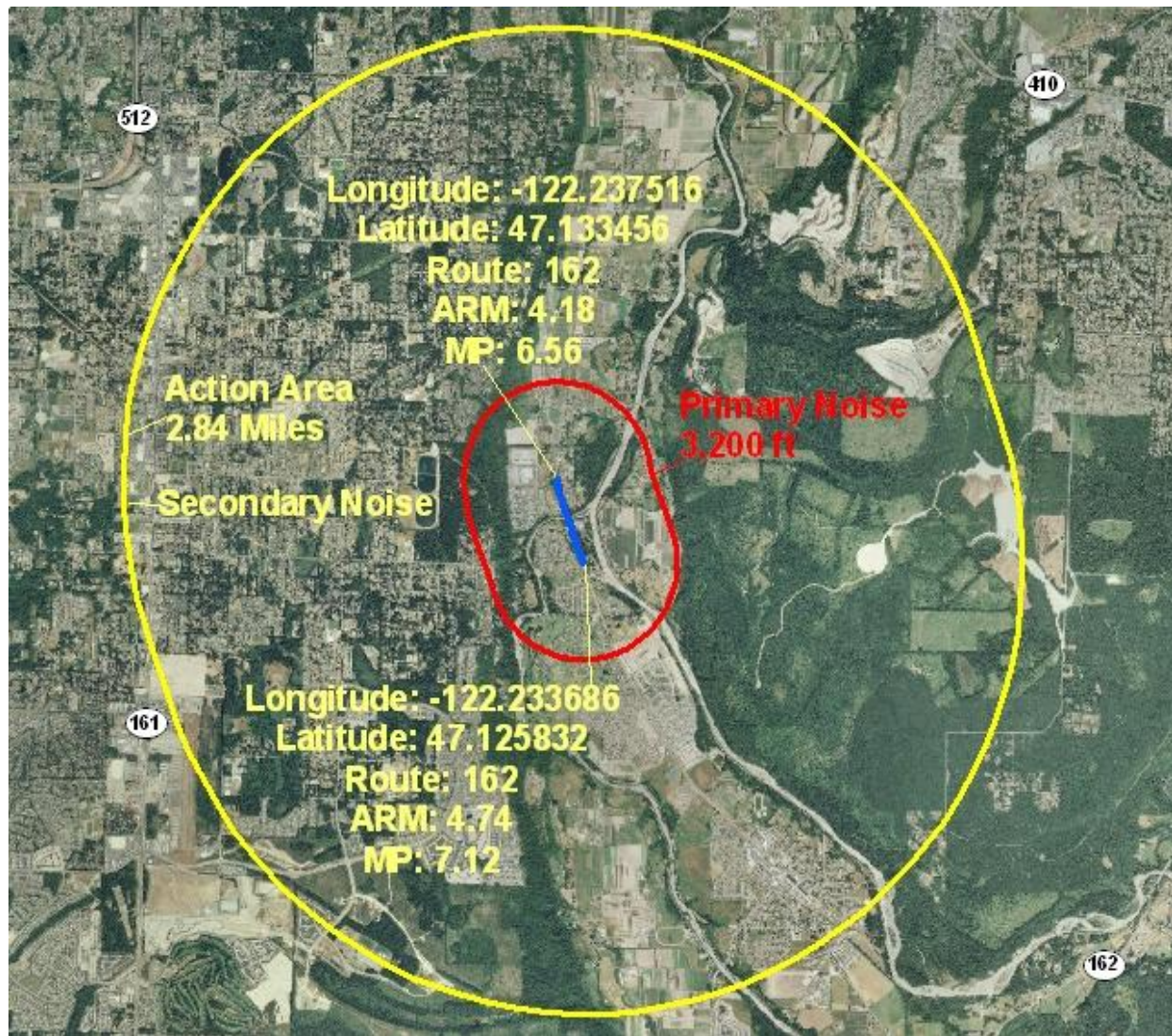


Figure 7: Action Area Map (2.84 Miles).

## 5. PROJECT VICINITY

### 5.1 PROJECT SETTING

The project is located in Pierce County, approximately 1.2 miles north of Orting, and 4.5 miles south of Sumner, Washington (Figure 1). SR 162 crosses the Puyallup River at approximate RM 18.1. SR 162 is a two lane asphalt roadway that serves as the primary route between the City of Tacoma and the smaller rural communities within the Puyallup River valley. Within and adjacent to the project area, SR 162 is a two-lane, 22-foot-wide road (Figure 8 & 9). The road extends in a north to south alignment through forest and rural home sites. Traffic volumes average 18,000 vehicles daily including residential, recreational, commercial, and logging truck traffic.



**Figure 8: Project Vicinity. View south.**



**Figure 9: Project vicinity. View north.**

## 5.2 WATER RESOURCES

The Puyallup River begins in two forks, the North Puyallup River and the South Puyallup River. Both originate at glaciers on Mount Rainier. The North Puyallup River flows from the toe of Puyallup Glacier, while the South Puyallup River flows from Tahoma Glacier. The two streams flow through the western part of Mount Rainier National Park, joining just outside the park boundary and forming the Puyallup River proper.

The main Puyallup River flows north and northwest from Mount Rainier. The tributary Mowich River, which also flows from glaciers on Mount Rainier, joins the Puyallup from the east. Below the Mowich confluence, the Puyallup River flows through a rugged region of mountains and foothills. The river is dammed at Electron Dam shortly below the Mowich confluence. The dam diverts a portion of the Puyallup River into a long flume, which runs for several miles to Electron, where the water is passed through turbines in a hydroelectric powerhouse before being returned to the river. The Puyallup River passes through a steep and narrow gorge between Electron Dam and the powerhouse.

After Electron, the river turns north and flows by the city of Orting, where it is joined by the Carbon River from the east immediately below the SR 162 Puyallup River Bridge. The Carbon River also originates at a glacier on Mount Rainier (the Carbon Glacier). The Puyallup River continues its northerly course after Orting. At Sumner, the river is joined by the White River, another glacier-fed river. At the White River confluence, the Puyallup River turns northwest, flowing by the cities of Puyallup, Fife, and the Puyallup Indian Reservation before emptying into Commencement Bay at the Port of Tacoma, part of the city of Tacoma. The Puyallup River is within the Puyallup-White Water Resource Inventory Area (WRIA) 10) and Hydraulic Unit Code 171100140403.

## 5.3 VEGETATION

Within the project area, the Puyallup River flows through private land, consisting of a few rural home sites, and a small area of second and third growth mixed conifer and deciduous forests. Riparian habitat within the project area is dominated by cottonwood (*Populus trichocarpa*), red alder (*Alnus rubra*), Douglas fir (*Pseudotsuga menziesii*), bigleaf maple (*Acer macrophyllum*), salmonberry (*Rubus spectabilis*), Himalayan blackberry (*Rubus armeniacus*), sword fern (*Polystichum munitum*), and giant horsetail (*Equisetum telmateia*).

## 5.4 GEOLOGY AND SOILS

The project area is level terrain. Existing side slopes along SR 162 vary between 2:1 to 4:1 with a 3.5% superelevation. Maximum grade on SR 162 in the project area is 2%. New side slopes for the south side of the bridge will vary from 4:1 to 2:1, on the north side of the bridge slopes are 4:1. The maximum grade for the new profile is slightly less than 2.9%.

Preliminary soil information for the Natural Resources Conservation Services (NRCS) map is identified as hydrologic group B, Puyallup fine sandy loam, and the north-east side of the project as hydrologic group C, and Aquic Herofluvents. Thirteen soil test pits were completed, which indicated the soils were 5-10% cobble, 6-70% gravel, 66-78% sand, and 2-30% silt.

## 5.5 WETLANDS

There are two small wetland areas within the action area (Figure 10 & 11). Wetland A is just south of 136th street on the west side of SR 162. It is located between the paved pedestrian trail and the right of way fence. The second wetland (Wetland B) is north of 136th street, on the west side of SR 162. It is located along the small tributary that goes through a culvert under SR 162. The project will not impact any wetlands. Vegetation within the two wetland areas consist of reed canary grass (*Phalaris arundinacea*), salmonberry (*Rubus spectabilis*), snowberry (*Symphoricarpos albus*) and hardhack (*Spiraea douglasii*).



**Figure 10: Wetland A.**



Figure 11: Wetland B.

## 6.0 PROJECT EFFECTS ON THE BIOLOGICAL, CHEMICAL, AND PHYSICAL ENVIRONMENT

This section considers the direct and indirect effects of the proposed action on the biological, chemical, and physical environment in the project vicinity, as well as the effects caused by interrelated or interdependent actions associated with the proposed action. This information is also presented in the exposure and response matrix in Appendix I.

### 6.1 DIRECT EFFECTS

Direct effects are defined as those effects that are directly related to the proposed action and occur as a result of project construction and/or operation (WSDOT 2006). The anticipated direct effects resulting from the proposed action and the magnitude and duration of these effects are described below.

#### 6.1.1 Terrestrial Noise

**Intensity:** Primary – Up to 91 A-weighted decibels (dBA) – Grader/Compactor/Excavator

Secondary - Up to 98 A-weighted decibels (dBA) – Concrete Shear/Saw/Hoe Ram

**Duration:** Primary – Approximately 13 months construction.

Secondary - Approximately 100 hours, over ten working days (2012)

The extent to which construction noise is expected to be heard was calculated based on the distance that construction noise attenuates to ambient levels. Following WSDOT guidance, construction noise was estimated based on the Primary and Secondary three loudest pieces of equipment and activities associated with the project (WSDOT 2006), including:

**Primary**

Grader – 89 dBA  
Compactor – 83 dBA  
Excavator – 81 dBA

**Secondary**

Concrete Shear – 96 dBA  
Concrete Saw – 90 dBA  
Hoe Mounted Ram – 90 dBA.

The FHWA and WSDOT have conducted research on noise levels produced by road construction activities and have developed formulae and guidance for predicting the maximum noise levels produced by simultaneous operation of different types of construction equipment (FHWA 2003). Following this guidance, the maximum noise produced by the proposed project can be estimated by assuming that the three loudest pieces of construction equipment will be operating simultaneously. The compactor, excavator, and grader are all within four to nine dBA. Therefore one dBA for the excavator and one dBA for the grader are added to the loudest piece of equipment (compactor – 89 dBA) for a total of 91 dBA. For the secondary pieces of equipment, the concrete shear is between four and nine dBA greater than the next two loudest pieces of equipment, and so one dBA for each other piece of equipment is also added. Therefore the maximum secondary noise that will be produced by the project is estimated at 98 dBA. Noise levels of this magnitude will only be reached when these types of equipment are operating simultaneously.

General construction activities will require 13 months of construction, working five days a week, during daylight hours. The secondary project activity (concrete demolition) is estimated to require 100 hours to complete the demolition of concrete of the existing SR 162 Puyallup River Bridge.

### **6.1.2 Underwater Noise**

**Intensity:** Slow Moving River – 135 dB RMS

Fast Moving River – 140 dBA RMS

**Duration:** Approximately 50 hours, over ten working days, July 16-20, 2012

Ambient noise levels in deep freshwater lakes or deep slow moving rivers are approximately 135 dB root mean square (RMS) similar to marine levels. In shallow (one-foot deep or less), fast moving rivers, the ambient noise levels are louder due to the water moving over rocks and boulders and the wave action at the surface. Ambient levels are approximated to 140 dB RMS in these systems (Laughlin 2005). The Puyallup River represents glide flow characteristics within the action area and therefore is most similar to a slow moving river (135 dbA).

The removal of concrete rubble/pier material will likely create some underwater noise disturbance. Underwater noise will only be propagated when water levels are greater than three feet due to the amplitude of the sound waves. This condition is predicted to occur in a minimal area along the right bank, as the channel is deepest in this area. Furthermore, due to summer low-flow conditions, this is expected to be minimal. An estimated 50 hours will be required to complete the removal of the concrete rubble along the right bank. Removal of the concrete rubble can only occur during the in-water work window, between July 16 and August 31, 2011.

### 6.1.3 Construction-Related Turbidity

**Extent:** Minor turbidity in the range of five nephelometric turbidity units (NTU) above background levels, during and following construction.

**Duration:** Brief pulses during work area isolation implementation (aquabarrier installation and removal), concrete rubble removal, and turbidity curtain installation and removal, July and August 2012, and a “first flush” effect during first large storm event of fall/winter 2012.

Construction-related activities including aquabarrier installation, pier/concrete rubble removal, and turbidity curtain installation and removal are likely to result in the release of minor short-term pulses of sediment into aquatic habitats in the Puyallup River. Additional pulses of sediment are likely to occur when the disturbed area is exposed to the first storm flows of the season (the “first flush” effect).

With regard to construction-related turbidity, the contractors will adhere to the terms of the 1998 implementing agreement between WSDOT and Ecology. This agreement specifies the downstream point of compliance with water quality standards that will be achieved for all WSDOT projects, essentially defining the zone of effect these projects will have on aquatic habitats. For systems such as the Puyallup River, which is expected to have a flow greater than 100 cfs at the time of the turbidity release, the point of compliance is 300 feet downstream of the further in-water work project activity. Project activities will be monitored to ensure that construction-related turbidity levels do not exceed five NTU above background levels. Should this occur, construction will halt and the BMPs will be inspected and modified as necessary to achieve compliance.

A first flush effect is likely to accompany the first storm flows of the fall and winter season, producing short-term, localized erosion and releases of sediment. Materials eroding from the structures will be composed primarily of native soil and alluvium. Available research has shown that suspended sediments eroded from construction sites following construction events typically settle out of the water column at the next point downstream where a significant change in hydraulic velocities occur, such as pools at bends or below riffles (Reid and Anderson 1999). Construction BMPs will limit the amount of construction-related turbidity from the project site. In reality, turbidity effects will be likely become indistinguishable almost immediately due to high storm flow turbidity levels likely to be present when the first flush effect occurs.

#### **6.1.4 Water Quality**

**Extent:** No net-increase in pollutant loading and no net-increase in effluent concentration.

**Duration:** In perpetuity.

There is currently 97,139 SF (2.23 acres) of impervious surface within the project area of which 39,171 SF (0.90 acres) will be replaced (Table 4). Net new impervious surface area will equal 46,950 SF (1.08 acres). The new stormwater system will collect all existing and new impervious surface within the project area and infiltrate 100% of the runoff. The project was designed to the 2008 Highway Runoff Manual (HRM) (WSDOT 2008).

Stormwater associated with highway runoff may contain low levels of cadmium, lead, chromium, and PAH compounds. Often, these compounds are at or below levels that can be detected with current analytical methods and may be effectively filtered or settled out in stormwater BMPs prior to being discharged to nearby waterbodies. Infiltration will provide additional quality treatment to the aquifer than what currently exists.

In-water construction activities will include the removal of existing concrete rubble and creosote treated piles. Some benefit to water quality is expected to result from the removal of the deteriorating concrete rubble. There are several old broken-off creosote-treated piles from the first bridge within the project limits. These creosote-treated piles may be removed by the contractor if required in the permitting process. Creosote-treated wood placed in-water is known to leach. Creosote contains over 300 compounds, including numerous variants of polycyclic aromatic hydrocarbons (PAH). Some variants of PAHs are known to be very toxic to fish and they tend to bioconcentrate (NMFS, 1998). Due to the decrease in pollutant concentrations and the beneficial effects associated with removal of concrete rubble and creosote treated material within the OHWL, the project is considered to have a beneficial effect on water quality and quantity.

## **7. ENVIRONMENTAL BASELINE**

### **7.1 HABITAT TYPES**

#### **7.1.1 Terrestrial**

The Puyallup River, within the action area, flows through private land, consisting of a few rural home sites, second and third growth forests, and grassy fields. Terrestrial habitat within the action area consists of flat gradient terrain. Existing slopes along SR 162 vary from 2:1 to 4:1. Maximum grade of SR 162 within the project area is 2%. Habitat within the project area is dominated by red alder, Douglas fir, bigleaf maple, salmonberry, Himalayan blackberry, and sword fern (Figure 2, 3, 4, 5).

### 7.1.2 Freshwater

The OHWL within the project area averages approximately 110 feet wide. The thalweg is currently against the rightbank (Figure 12). Large gravel and small cobble dominate the substrate. The rightbank is armed with riprap throughout the project area and immediately underneath the existing SR 162 bridge, the south pier is protected with large concrete rubble from the original bridge piers (Figure 13). Stream habitat within the project area consists of glide habitat with minimal deep pool habitat along the rightbank. Water within the stream is often milky during spring runoff due to glacial melt and the sediment contains a moderate amount of fines (estimated less than 12 percent). Less than 10 percent of the stream banks within the action area appear to be actively eroding. Wood in the channel is lacking and there is minimal potential recruitment within the riparian corridor. Minimal shade providing vegetation, large woody debris (LWD), or LWD recruitment is provided by the riparian corridor within, up and downstream of the project area. There are no fish passage barriers within the action area. The environmental baseline for Puyallup River is further described in Table 6 and Appendix J.



**Figure 12: Thalweg location and example of typical substrate.**



Figure 13: Large concrete rubble to be removed.

Table 6: Puyallup River Salmonid Environmental Baseline Condition Summary

Pathways	Indicators	Watershed Baseline	Project Area Baseline
Water Quality	Temperature	Prop. Func.	At Risk
	Sediment	At Risk	Not Prop. Func.
	Chemical Contamination & Nutrients	Not Prop. Func.	Prop. Func.
Habitat Access	Physical Barriers	Not Prop. Func.	Prop Func.
Habitat Elements	Substrate	At Risk	At Risk
	Large Woody Debris	Not Prop. Func.	Not Prop. Func.
	Pool Frequency	At Risk	Not Prop. Func.
	Pool Quality/Size	At Risk	At Risk
	Off-Channel Habitat	Not Prop. Func.	Not Prop. Func.
Channel Conditions and Dynamics	Refugia	At Risk	Not Prop. Func.
	Width/Depth Ratio	At Risk	At Risk
	Streambank Condition	Not Prop. Func.	Not Prop. Func.
	Floodplain Connectivity	Not Prop. Func.	Not Prop. Func.
Flow/Hydrology	Change in Peak/Base Flows	Not Prop. Func.	At Risk
	Increase in Drainage Network	Not Prop. Func.	Not Prop. Func.
Watershed Conditions	Road Density and Location	Not Prop. Func.	At Risk
	Disturbance History	Not Prop. Func.	At Risk
	Disturbance Regime	Not Prop. Func.	At Risk
	Riparian Reserve/Cons. Areas	Not Prop. Func.	At Risk
Bull Trout Sub-population Characteristics Within Sub-	Sub-population Size	Unknown	Unknown
	Growth and Survival	Unknown	Unknown

Pathways	Indicators	Watershed Baseline	Project Area Baseline
population Watersheds	Life History Diversity and Isolation	Unknown	Unknown
	Persistence and Genetic Integrity	Unknown	Unknown
Species and Habitat (Bull Trout)	Species Integration/Habitat Conditions	Unknown	Unknown

## 8. SPECIES OCCURRENCE

### 8.2 AQUATIC SPECIES

#### 8.2.1 Puget Sound Chinook

Puget Sound Chinook stocks were listed on the federal register of endangered species in 1999, and are currently designated as “threatened.” Two distinct stocks of Chinook are present in the Puyallup/White River system. They include the White River spring Chinook and Puyallup River fall Chinook. White River spring Chinook are the only spring Chinook stock existing in the Puget Sound region and are unique due to their genetic and life history traits (WDFW et al. 1996). This unique stock of Chinook was classified as distinct in the 1992 Washington State Salmon and Steelhead Inventory (WDFW et al. 1993).

Spring Chinook enter the freshwater river system as early as May, and hold in the river until spawning commences in mid August. Adults generally return as three to four year olds; However, the age of fish returning to spawn can range between two to five years. Mainstem spawning by spring Chinook in the upper White River has been documented by Puyallup Tribal Fisheries (PTF) biologists via radio tracking (Ladley et al. 1996). Spring Chinook spawning also occurs throughout most of the lower 24.3 miles of the White River. Egg to fry emergence of young Chinook takes approximately 90-110 days depending on water temperature. The majority of juvenile spring Chinook (80%) migrate to saltwater as subyearlings (0 age, less than one year old) (Dunston 1955). DNA and aging analysis of adult Chinook collected from the U.S. Army Corps of Engineers’ (USACE) fish trap in Buckley and integrated into the Muckleshoot’s White River spring Chinook program, showed that 77% of the spring Chinook sampled migrated to saltwater as subyearlings (Marks et. al. 2008).

Escapement data for White River spring Chinook has been collected from fish captured in the USACE fish trap in Buckley since 1941. After 1950, there was a steep decline in the number of spring Chinook captured in trap. Spring Chinook escapements dropped under 1,000 fish annually after 1955, continued to drop to as few as 66 fish in 1977, and dipped down to only six fish in 1986. This precipitous decline prompted the State of Washington and South Puget Sound tribes to implement a recovery plan in the mid 70s. The recovery plan involved starting a program involving the artificial propagation of wild and captive brood stocks. Currently, there are two spring Chinook programs in operation; the Muckleshoot Indian Tribe’s hatchery on the White River and WDFW’s Minter Creek program. These artificial propagation programs in conjunction with the use of acclimation ponds, continues to be an integral part of restoring the run to its historic levels.

Puyallup River fall Chinook are endemic throughout the Puyallup River, Carbon River, Lower White River, and many of the associated tributaries to these mainstem river systems. A large component of the adult fall spawners are hatchery origin from the WDFW fall Chinook program operated on Voight Creek. In 2004, the Puyallup Tribe began operation of its own fall Chinook hatchery on Clarks Creek located off the lower Puyallup River. The Puyallup River Fall Chinook Baseline Report (WDFW 2000) states that genetic testing has shown similarities in both hatchery and wild Puyallup River fall Chinook, with those of Chinook stocks found in several other watersheds within the Puget Sound region. The similarities are likely due to significant numbers of fall Chinook imported to these watersheds from the Green River hatchery. Evidence shows a significant number of Puyallup River fall Chinook stray into the White River system to spawn. Carcass sampling from 2003 to 2006 on Boise Creek, a tributary to the White, showed 47-64% of Chinook sampled to be of hatchery origin due to the presence of a coded wire tag and or adipose fin clip. Although spring Chinook are known to spawn in the Puyallup River system, the straying rate is significantly less than that of Puyallup origin fall Chinook (Marks et. al. 2008).

Puyallup River fall Chinook enter the Lower Puyallup River in June, and continue to move through the system as late as November. The majority of spawning occurs from September to late October, with the exception of some of the lower tributaries that often have fish present into early November. The age of adult fall Chinook returning to spawn can range between two to five years of age. However, the larger components of adults return as four year olds; with a smaller number returning as three year olds.

In 2000, the PTF started the Puyallup River Smolt Production Assessment Project to estimate juvenile production of native salmonids, with an emphasis on natural fall Chinook salmon production and survival of hatchery and acclimation pond Chinook. Since 2000, an E. G. Solutions' 5ft diameter rotary screw trap located on the lower Puyallup at RM 10.6, approximately seven miles downstream of the project action area, has been used to estimate juvenile production. For the 2007 migration season production estimates were completed for Chinook. Natural Chinook production was estimated at 12,257 migrants from a catch of 243 unmarked Chinook. Outmigration occurred between February 24 and August 8 (Marks et al. 2008).

The majority of post emergent fry spend a short period of time residing instream before migrating to saltwater. Trapping data from a rotary screw trap in the lower Puyallup River shows that 99.7% (911) of wild outmigrant Chinook caught were subyearlings (Marks et al. 2008). Chinook downstream migration in the Puyallup begins as early as late February and runs as late as the end of August, with the peak of the run occurring around the end of May.

The presence of juveniles that rear in freshwater for over one year creates the potential that juveniles could be present in the action area throughout the year, but abundance would be highest during the spring. Rearing habitat is very limited in the project action area as habitat complexity such as overhanging vegetation, side channels, and LWM are virtually absent. Additional species life history information is contained within Appendix K.

### 8.2.1.1 Puget Sound Chinook Critical Habitat

Critical habitat for Puget Sound Chinook salmon was designated on September 2. The project action area is within Puget Sound Chinook designated critical habitat. The Primary Constituent Elements (PCEs) essential for the conservation of these ESUs are those sites and habitat components that support one or more life stages. The PCEs are further described below.

- (1) Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation and larval development;*
- (2) Freshwater rearing sites with:*
  - (i) Water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility;*
  - (ii) Water quality and forage supporting juvenile development; and*
  - (iii) Natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.*
- (3) Freshwater migration corridors free of obstruction and excessive predation with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival;*
- (4) Estuarine areas free of obstruction and excessive predation with:*
  - (i) Water quality, water quantity, and salinity conditions supporting juvenile and adult physiological transitions between fresh- and saltwater;*
  - (ii) Natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels; and*
  - (iii) Juvenile and adult forage, including aquatic invertebrates and fishes, supporting growth and maturation.*
- (5) Nearshore marine areas free of obstruction and excessive predation with:*
  - (i) Water quality and quantity conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation; and*
  - (ii) Natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels.*
- (6) Offshore marine areas with water quality conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation.*

### 8.2.2 Coastal/Puget Sound Bull Trout

Bull trout are present in the Puyallup River watershed (WDFW, 1998). The WDFW has separated bull trout in this system into three stocks: Puyallup River, White River, and Carbon River due to the probable geographic isolation of their spawning populations. Data on spawning time and location is not available, but habitat for anadromous, fluvial, and resident forms is present (WDFW, 1998). Since the project area is associated with the lower reach of the Puyallup River where spawning would not occur, bull trout use of the Puyallup River in the action area is limited to migration of the anadromous form and limited rearing.

The following discussion on the migration habits of anadromous bull trout is from research conducted by the WDFW in northern Puget Sound (WDFW, 1994), and is the basis for when they could occur in the action area. Sub-adult bull trout migrate downstream to the mouth of their natal river and nearby marine waters during the spring (April, May, and early June). They then feed in marine waters during the spring and summer. These fish then migrate back to freshwater during the late summer and early fall. They will spend the winter in freshwater, typically in the lower 22 to 25 miles of river. After overwintering in freshwater they return to the marine environment as early as late February. After spending several months in the marine environment, these sub-adults have matured and are now ready to begin their first spawning migration and will leave tidal areas in late May, June, and early July. Based on this data, it appears that anadromous bull trout could occur in the action area throughout the year. Peak bull trout foraging in the lower reach of the Puyallup River is likely to coincide with the outmigration of juvenile salmonids during the spring. Additional species life history information is contained within Appendix K.

#### 8.2.2.1 Coastal/Puget Sound Bull Trout Critical Habitat

The USFWS designated critical habitat for the coastal\Puget Sound Distinct Population Segment (DPS) of bull trout on June 25, 2004. The Puyallup River within the project action area is part of the Puyallup Critical Habitat Sub-unit (CHSU). The Puyallup CHSU includes the Puyallup River and its two major tributary systems, the White River and the Carbon River, and their associated tributaries accessible to bull trout. The Puyallup River from its mouth at Puget Sound upstream approximately 46.2 miles to the confluence of the North and South Puyallup Rivers, provides primarily forage, migration, and over-wintering (FMO) habitat for the Puyallup core area.

PCEs of critical habitat are the known physical and biological features that are essential to the conservation of the species. The PCEs for bull trout are:

- 1. Water temperatures ranging from 36 to 59 °F (2 to 15 °C) with adequate thermal refugia available for temperatures at the upper end of this range. Specific temperatures within this range will vary depending on bull trout life history stage and form, geography, elevation, diurnal and seasonal variation, shade (such as that provided by riparian habitat), and local groundwater influence;*
- 2. Complex stream channels with features such as woody debris, side channels, pools, and undercut banks to provide a variety of depths, velocities, and instream structures;*

3. *Substrates of sufficient amount, size, and composition to ensure success of egg and embryo overwinter survival, fry emergence, and young-of-the-year and juvenile survival. A minimal amount of fine substrate less than 0.25 inches (0.63 centimeters) in diameter and minimal substrate embeddedness are characteristic of these conditions;*
4. *A natural hydrograph, including peak, high, low, and base flows within historic ranges, or if regulated, a hydrograph that demonstrates the ability to support bull trout populations by minimizing daily and day-to-day fluctuations and minimizing departures from the natural cycle of flow levels corresponding with seasonal variation;*
5. *Springs, seeps, groundwater sources, and subsurface water connectivity to contribute to water quality and quantity;*
6. *Migratory corridors with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and foraging habitats, including intermittent or seasonal barriers induced by high water temperatures or low flows;*
7. *An abundant food base including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish;*
8. *Permanent water of sufficient quantity and quality such that normal reproduction, growth and survival are not inhibited.*

### **8.2.3 Puget Sound Steelhead**

Steelhead are present throughout the Puyallup/White River watershed. Steelhead offspring can become anadromous, or remain in freshwater for their entire lives. In May of 2007, NOAA's National Marine Fisheries Service released a statement that they were listing Puget Sound steelhead as "threatened" under ESA. The ESA protection covers naturally spawned steelhead and some hatchery stocks.

The major run of steelhead to the Puyallup/White River system is winter run. However, a few summer run strays most likely from the Green or Skagit Rivers are caught annually during August and September in the lower Puyallup, and at the USACE trap on the White River. Therefore, steelhead are present in the watershed throughout the year. The main run of winter steelhead enters the Puyallup River in November, with the peak of the run occurring in mid December. On the White River, steelhead are occasionally caught in the USACE trap as early as late December. Although, most fish don't start migrating towards the upper reaches until March. The winter run continues through June, with peak migration occurring in mid to late April. PTF spawning ground data shows peak spawning takes place in late April to early May (Marks et al. 2008).

Steelhead spawners frequently utilize the mainstem Puyallup, White and Carbon Rivers; although, the majority of spawning takes place in many of the associated tributaries. Some of the

major tributaries on the White River supporting winter steelhead include Boise Creek; and the Clearwater and Greenwater Rivers. Along the Puyallup River; the upper reach tributaries of Kellogg, Niesson and Ledout Creek, support the majority of spawners. In addition, the roughly five miles of mainstem river channel below the Electron diversion dam (RM 41.7) consistently experiences a small number of spawners as well. The habitat above Electron has been accessible since the completion of a 215 foot fish ladder in the fall of 2000. Steelhead are known to be accessing the reach above the Electron Dam, yet little is known about spawning or rearing utilization and distribution. Currently, the only information available is from aerial surveys conducted on the upper Puyallup River in the spring of 2005 and 2006. Surveys conducted in 2006, reveal limited steelhead spawning activity in the mainstem Puyallup River. The Carbon River mainstem, below river mile 11, has consistently supported several steelhead spawners. Spawning ground survey data from 1995 to 2006, shows an average of 15.8 redds annually (range 0-54) in the mainstem Carbon. South Prairie Creek, a substantial tributary to the Carbon River, has long been the one of the most significant salmon and steelhead drainage in the Puyallup basin. Survey data obtained from WDFW shows the average number of steelhead redds observed in South Prairie from 1999 to 2005, was 133 (range 32-196). Voight Creek, on the lower Carbon, also experiences a small steelhead escapement.

The winter steelhead stocks in the Puyallup basin have been declining since 1990. The precipitous decline within just the past three years has created serious concern among fisheries managers. Factor(s) responsible for the decline in steelhead escapement are unknown, especially when other salmon species are experiencing relatively good success. Escapement numbers for the USACE trap in Buckley during 2005 (152 adults) was the lowest ever recorded since 1941. South Prairie Creek averaged 150 redds annually (range 93-196) from 1999 to 2004; however, only 32 redds were observed in 2005. Fortunately, escapement increased in 2006 and 2007 (129 redds in 2006 & 168 in 2007). Decreased numbers of redds have been observed in several other drainages as well; yet a few, such as Boise Creek on the White River, have experienced relatively strong returns in spite of the basin wide declines. The smolt trapping program operated by the Puyallup Tribe's Fisheries department on the Puyallup River has observed a substantial decrease in the number of steelhead smolts captured from 2003 to 2005 (average 62.6 [range 39-77] from 2003-2005 vs. average of 315 [range 156-539] from 2000-2002) (Marks et al. 2008). The previous numbers don't include the steelhead escapement for the White River due to the traps location approximately 0.2 miles above the White/Puyallup confluence.

During the spring of 2006, in response to the declining number of winter steelhead, the Puyallup and Muckleshoot Tribes, as well as the WDFW, began a supplementation pilot project developed for the White River. The primary goal of this project is to restore the run to a strong self sustaining population. The pilot project will utilize captured wild brood stock from the USACE trap in Buckley to generate approximately 35,000+ yearling smolts. The success or failure of this project will likely determine if an additional supplementation program will be implemented on the Puyallup River.

In 2000, the PTF started the Puyallup River Smolt Production Assessment. Since 2000, an E. G. Solutions' 5ft diameter rotary screw trap located on the lower Puyallup at RM 10.6, approximately seven miles downstream of the project action area, has been used to estimate juvenile production. Twenty-five unmarked steelhead were caught in the smolt trap in 2007. No production estimates were completed for steelhead migrants (Marks et al. 2008). Additional species life history information is contained within Appendix K.

Habitat in the project action area is primarily used by steelhead for migration purposes. Although the Salmon and Steelhead Stock Inventory illustrates that the project area is within the spawning and rearing distribution for the Puyallup River steelhead.

#### **8.2.4 Pacific Eulachon**

On November 27, 2007, NMFS received a new petition seeking to list eulachon in Washington, Oregon, and California as a threatened or endangered “species” under the ESA (Cowlitz Indian Tribe 2008). NMFS evaluated the petition to determine whether the petitioner provided “substantial information” as required by the ESA to list a species. Additionally, NMFS evaluated whether information contained in the petition might support the identification of a DPS that might warrant listing as a species under the ESA. NMFS determined that the November 27, 2007 petition did present substantial scientific and commercial information, or cited such information in other sources, that the petitioned action may be warranted and, subsequently, NMFS initiated a status review of eulachon in Washington, Oregon, and California (NMFS 2008).

The project biologist contacted WDFW on August 17, 2009. There are no known reliable records of Pacific Eulachon utilizing the the Puyallup River for spawning (pers. Comm.. Bargman, 2009).

## **9.0 EFFECTS ANALYSIS**

The proposed project will have both direct and indirect effects on bull trout, Chinook and steelhead occurring within the action area, as well as direct and indirect effects on designated critical habitat for bull trout and Chinook.

### **9.1 DIRECT EFFECTS**

Direct effects include those direct or immediate impacts on federally listed species and their habitat that are likely to occur as a result of the proposed project. Direct effects are detailed for coastal/Puget Sound bull trout, Puget Sound Chinook, and Puget Sound steelhead.

#### **9.1.1 Direct Effects on Bull Trout, Chinook, and Steelhead**

Potential direct effects on bull trout, Chinook, and steelhead resulting from the project, fall into three categories: (1) underwater effects of pier/concrete rubble removal; (2) the effects of short-term construction-related turbidity; and (3) the immediate effects of the project on habitat.

##### **9.1.1.1 Direct Effects from pier/concrete rubble removal**

The extent of underwater noise generated during pier and concrete rubble removal will be generally confined to the immediate area due to the natural topography of the river bottom. Minimal underwater noise is expected to propagate approximately 100 feet downstream to where the majority of the river cross-section is expected to be less than three feet in depth (riffle) during the summer low-flow period. Upstream underwater noise is expected to extend upstream approximately only 100 feet due to stream bed contours and flow deflection.

In-water work will preclude any juvenile Chinook, bull trout, and/or steelhead from utilizing the large rubble for cover from predation, in addition to creating a major disturbance immediately within the thalweg furthermore creating a temporary fish passage barrier during concrete removal. If Chinook, bull trout, and steelhead do occur in this area during pier/concrete rubble removal, they may be startled, injured, or even crushed by concrete rubble movement.

#### **9.1.1.2 Direct Effects from Exposure to Construction-Related Sediment and Turbidity**

In the location of the existing concrete rubble and bridge pier removal, in-water work may potentially affect rearing migrating bull trout, Chinook, and steelhead due to temporary increases in sediment and turbidity. Increases will be temporary and limited spatially to a first flush as the channel is exposed to rain and/or high flows for the first time. Exposure of bull trout, Chinook, and steelhead to sediment and turbidity impacts would be limited to approximately 300 feet of the stream channel below the in-water work area during construction and downstream to the limits of the action area following the first storm flush of the area. Rearing, migrating, and foraging bull trout, Chinook, and steelhead are likely to be exposed to elevated levels of suspended sediments as a result.

While juveniles of many salmonid species thrive in rivers and estuaries with naturally high concentrations of suspended solids, studies have shown that suspended solids concentration (as well as the duration of exposure) can be important factors in assessing risks posed to salmonid populations (Servizi and Martens 1987).

Elevated turbidity levels can cause stress by impairing the salmonid's ability to locate predators, find prey, or defend territories, or by creating uncomfortable conditions for gill functioning. Increased stress can compromise the effectiveness of the immune system, thereby affecting mortality rates (USFWS, 1998). Increased stress can also affect blood physiology, thereby decreasing immunological competence, growth, and reproductive success.

Construction-related turbidity will be managed to limit turbidity increases to five nephelometric units (NTU) above background levels or less 300 feet downstream of the furthest downstream point of in-water work. Rearing juveniles and migratory adults would be the only life-history stages exposed to this effect, meaning that the levels realized are likely sufficient only to cause temporary behavioral responses. Similarly, while the first flush effect following exposure of the completed structures to seasonal storm flows may be greater in magnitude, it is not expected to lead to turbidity levels sufficient to exceed behavioral effects.

#### **9.1.1.3 Direct Effects from Work Area Isolation**

Isolation of approximately 1000 square feet of the 4400 square foot work area within the Puyallup River and volitional removal of fish is an action designed to avoid the injury or death of listed species from project construction (e.g. pier/concrete rubble removal). To address the effects of work area isolation on listed coastal/Puget Sound bull trout, Puget Sound Chinook salmon, and Puget Sound Steelhead, the project again includes measures to reduce the likelihood and extent of exposure of these listed fish to these effects. These measures include restricting the timing of any in-water work to July 15 through August 31. As stated above, rearing juvenile and adult migrating White River spring-run and adult migrating Puyallup River fall-run Chinook, and sub-adult bull trout are expected to be in the lower Puyallup River within the action area when work area isolation and fish handling are proposed.

Volitional and/or manual (seining/electrofishing) fish removal can stress fish. Relocated fish are expected to survive with no long-term effects, including delayed mortality, and a very small percent are expected to be stranded during work area isolation. The variability is in part a function of communication between the contractor and fish removal staff experience and site specific conditions.

#### 9.1.1.4 Direct effects on Habitat Conditions

In addition, the installation of the work area isolation aquabarrier dam will dewater and temporarily displace streambed habitat, although this effect will be temporary in nature, an impact to prey species (invertebrates) is likely to occur. The project will affect habitat conditions by streambed and riverbank alteration resulting from the installation of the temporary demolition containment structure, the installation of several large hydraulic jacks (15.9 CY [285 SF]) for lowering the existing bridge onto the gravel bar, and removal of the existing concrete rubble (135 CY [640]) on the rightbank. The existing bridge is also to be demolished on the existing gravelbar behind the aquabarrier dam, although protected, further disturbing the gravelbar. Clearing of vegetation near the Puyallup River to provide construction access will further degrade habitat conditions during the construction period. However, these cleared areas will be restored and, as such, the effects will be temporary.

Riparian habitat impacts may reduce shading within 20 feet of the bridge; however a wider bridge will provide additional shade, which will help balance the temporal effects of solar exposure until the riparian is restored; although several dominate trees will be removed. The riparian corridor within the project and action area is not well established. Therefore, a reduction in invertebrate populations and shading loss due to the bridge replacement is expected. Minor impacts to LWD recruitment are also expected. If trees were left they could potentially be recruited into the stream as LWD at a later date. Impacts to sediment storage and littoral input will be anticipated due to the removal of trees within the riparian.

In regards to the overall project, modifications of baseline conditions will occur to certain indicators (Table 7).

**Table 7: Salmonid Effects Matrix**

Pathway	Indicators	Watershed Baseline Cond.	Project Area Baseline Cond.
<b>Water Quality</b>	Temperature	<b>Maintain</b>	<b>Temp. Degrade</b>
	Sediment	<b>Maintain</b>	<b>Temp Degrade</b>
	Chemical Contamination and Nutrients	<b>Maintain</b>	<b>Improve</b>
<b>Habitat Access</b>	Physical Barriers	<b>Maintain</b>	<b>Maintain</b>
<b>Habitat Elements</b>	Substrate	<b>Maintain</b>	<b>Maintain</b>
	Large Woody Debris	<b>Maintain</b>	<b>Temp. Degrade</b>
	Pool Frequency	<b>Maintain</b>	<b>Degrade</b>
	Pool Quality	<b>Maintain</b>	<b>Degrade</b>
	Off-Channel Habitat	<b>Maintain</b>	<b>Maintain</b>
	Refugia	<b>Maintain</b>	<b>Degrade</b>

Pathway	Indicators	Watershed Baseline Cond.	Project Area Baseline Cond.
<b>Channel Conditions and Dynamics</b>	Width/Depth Ratio	<b>Maintain</b>	<b>Degrade</b>
	Streambank Condition	<b>Maintain</b>	<b>Maintain</b>
	Channel Confinement	<b>Maintain</b>	<b>Improve</b>
	Floodplain Connectivity	<b>Maintain</b>	<b>Maintain</b>
<b>Flow/Hydrology</b>	Change in Peak/Base Flows	<b>Maintain</b>	<b>Maintain</b>
	Increase in Drainage Network	<b>Maintain</b>	<b>Maintain</b>
<b>Watershed Conditions</b>	Road Density and Location	<b>Maintain</b>	<b>Maintain</b>
	Disturbance History	<b>Maintain</b>	<b>Maintain</b>
	Riparian Reserve	<b>Degrade</b>	<b>Degrade</b>
<b>Bull Trout Sub-Population Characteristics Within Sub-population Watersheds</b>	Sub-population Size	<b>Maintain</b>	<b>Maintain</b>
	Growth and Survival	<b>Maintain</b>	<b>Maintain</b>
	Life History Diversity and Isolation	<b>Maintain</b>	<b>Maintain</b>
	Persistence and Genetic Integrity	<b>Maintain</b>	<b>Maintain</b>
<b>Species and Habitat (Bull Trout)</b>	Species Integration/Habitat Conditions	<b>Maintain</b>	<b>Maintain</b>

## 9.1.2 PUGET SOUND CHINOOK CRITICAL HABITAT

### 9.1.2.1 Primary Constituent Elements and Effects

The NMFS defines critical habitat as areas that contain the primary constituent elements (PCEs) required by the species. PCEs are those physical and biological features of a landscape that are essential for the conservation of the species. The analysis for salmonid habitat largely applies to Chinook salmon critical habitat. Critical habitat for Chinook salmon includes six PCEs. A brief summary of each PCE and potential project effects on the PCEs are shown below.

*(1) Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation and larval development.*

Impacts to spawning habitat are unlikely. Documented Chinook salmon spawning habitat is upstream of the project area and will not be impacted by the project. However, habitat conditions within and downstream of the project area appear to be suitable habitat.

*(2) Freshwater rearing sites with:*

*(i) Water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility;*

- (ii) *Water quality and forage supporting juvenile development; and*
- (iii) *Natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.*

Chinook salmon rearing habitat is extremely limited in the Lower Puyallup River within the action area. The removal of concrete rubble and riparian habitat has the potential to reduce cover and therefore the project may result in further degradation of potential rearing habitat.

- (3) *Freshwater migration corridors free of obstruction and excessive predation with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival.*

The installation of the work area isolation methods (aquabarrier dam) in conjunction with the in-water work of removing the existing pier/concrete rubble is likely to create a temporary obstruction within the migration corridor and reduce adult mobility. The removal of concrete rubble is likely to reduce cover, potentially increasing predation and reducing survival.

- (4) *Estuarine areas free of obstruction and excessive predation with:*

- (i) *Water quality, water quantity, and salinity conditions supporting juvenile and adult physiological transitions between fresh- and saltwater;*
- (ii) *Natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels; and*
- (iii) *Juvenile and adult forage, including aquatic invertebrates and fishes, supporting growth and maturation.*

The project will not affect the baseline conditions of estuarine habitat as no estuarine habitat is within the action area.

- (5) *Nearshore marine areas free of obstruction and excessive predation with:*

- (i) *Water quality and quantity conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation; and*
- (ii) *Natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels.*

The project will not affect the baseline conditions of nearshore habitat as no nearshore habitat is within the action area.

- (6) *Offshore marine areas with water quality conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation.*

The project will not affect the baseline conditions of offshore marine habitat as no offshore marine habitat is within the action area.

### 9.1.3 COASTAL/PUGET SOUND BULL TROUT CRITICAL HABITAT

#### 9.1.3.1 Primary Constituent Elements and Effects

The Puyallup River is designated bull trout critical habitat. The analysis for salmonid habitat largely applies to bull trout critical habitat. However, it is important to note that bull trout use of critical habitat within the action area is limited to foraging and migration in the Puyallup River. A brief summary of PCEs and potential project effects on the PCEs are shown below.

1. *Water temperatures ranging from 36 to 59 °F (2 to 15 °C) with adequate thermal refugia available for temperatures at the upper end of this range. Specific temperatures within this range will vary depending on bull trout life history stage and form, geography, elevation, diurnal and seasonal variation, shade (such as that provided by riparian habitat), and local groundwater influence;*

Bull trout refugia is provided by complex, shade-providing habitat. The lower Puyallup River within the project action area is primarily devoid of refugia and bull trout use is limited to foraging and migration. The project will have a minor negative impact on this PCE due to the small reduction of riparian habitat potentially reducing refugia for bull trout prey species.

2. *Complex stream channels with features such as woody material, side channels, pools, and undercut banks to provide a variety of depths, velocities, and instream structures;*

Complex stream habitat is largely absent from the lower Puyallup River within the project action area. The project may have a negative impact on this PCE with the removal of the concrete rubble and riparian species which in the time being and future is likely to reduce the complexity of the stream habitat.

3. *Substrates of sufficient amount, size, and composition to ensure success of egg and embryo overwinter survival, fry emergence, and young-of-the-year and juvenile survival. A minimal amount of fine substrate less than 0.25 inches (0.63 centimeters) in diameter and minimal substrate embeddedness are characteristic of these conditions;*

Bull trout spawning habitat does not occur within the project action area. No impacts to this PCE are anticipated.

4. *A natural hydrograph, including peak, high, low, and base flows within historic ranges, or if regulated, a hydrograph that demonstrates the ability to support bull trout populations by minimizing daily and day-to-day fluctuations and minimizing departures from the natural cycle of flow levels corresponding with seasonal variation;*

The hydrograph within the project action area is likely not within its historic range due to the urban development in the basin. The Puyallup River will continue to experience peak, high, low, and base flows outside of its historic range following project completion due to the continuance of development within the basin.

5. *Springs, seeps, groundwater sources, and subsurface water connectivity to contribute to water quality and quantity;*

Groundwater and subsurface connectivity are factors that influence bull trout spawning site selection because they increase the amount of cool, well oxygenated water to stream systems during low flow periods. Bull trout spawning habitat does not occur within the project action area. Infiltration will be utilized which will increase groundwater recharge.

6. *Migratory corridors with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and foraging habitats, including intermittent or seasonal barriers induced by high water temperatures or low flows;*

The installation of the work area isolation methods (aquabarrier dam) in conjunction with the in-water work of removing the existing pier/concrete rubble is likely to create a temporary obstruction within the migration corridor and reduce adult mobility. The removal of concrete rubble is likely to reduce cover, potentially increasing predation and reducing survival.

7. *An abundant food base including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish;*

The partial dewatering of the river channel is likely to reduce the food base in the immediate project area. The removal of some riparian species will also temporarily reduce the food base including terrestrial organisms of riparian origin.

8. *Permanent water of sufficient quantity and quality such that normal reproduction, growth and survival are not inhibited.*

The SR 162 Puyallup River Bridge Replacement project will not affect the permanent water of sufficient quantity or quality such that normal reproduction, growth, and or survival will be inhibited. Permanent beneficial contributions to flow quantity and quality will be provided with the improved stormwater drainage system.

## **9.2 INDIRECT EFFECTS**

Indirect effects are those effects that are not caused directly by the construction of the project or its operation, but are nonetheless related and occur later in time (WSDOT 2006). The proposed project is anticipated to change the surrounding environment by reducing river constrictions permitting a more natural river meander. This will continue to affect habitat conditions beyond the completion of the project, with long-term effects that are expected to range from neutral to mildly degrading in terms of their effects on ESA-listed bull trout, Chinook, and steelhead. Allowing for less restricted river flow patterns may have a minor effect in the short-term as the streambed and aquatic species resort their position in the river. However, the migration of the thalweg is a natural river process to which the species living in the river are naturally adapted and therefore is expected to have no long-term degrading effects on bull trout, Chinook, or steelhead, or their habitats.

In addition to indirect physical and biological effects on the environment, WSDOT guidance requires that the assessment of indirect effects include consideration of the potential for development induced by the project and the related effects of this development on the environment (WSDOT 2006a). WSDOT has developed a procedure for evaluating the indirect effects of growth induced by transportation projects so that these effects can be considered in the project biological assessment. This guidance was developed through a series of discussions with the USFWS, NMFS, FHWA, and the Office of Community Development, with input from local agencies and stakeholder groups (WSDOT 2006).

The guidance provides a list of 10 questions and a decision matrix that are used to determine whether the proposed project will result in indirect effects related to induced growth. These questions are listed below, along with their applicability to this project.

1) Does the project create a new facility or increase the capacity of an existing system?

No. The capacity of the existing system will not increase or decrease; only the configuration of the bridge supports and minor road alignment will occur.

2) Is new development in the vicinity contingent on the transportation project (i.e., would not occur without the project)?

No development is contingent upon the rebuilding of the Puyallup River Bridge.

3) Is any development in the vicinity caused by or dependent on the project?

No. This project will not improve access to undeveloped areas suitable or available for development.

4) Define the action area.

As discussed in the following section, the limits of the action area for this project are defined by the extent of the direct noise impacts from the operation of construction equipment, construction related water disturbance and water quality effects, the anticipated extent of geomorphic effects resulting from the project, and related biological responses.

No indirect effects will occur outside of these limits (see *Action Area* section). The project will not change roadway capacity or induce growth in any way; therefore, these issues are not pertinent to the definition of the action area.

5) Are proposed or listed species and/or designated critical habitats within the action area?

Yes, as described in the previous sections.

6) If development is contingent or dependent on the project, what potential impacts on the species and habitat will result from the development?

No development is contingent or dependent on the proposed project; therefore, no related impacts on species and habitat will occur.

7) What rules or measures are in place to help minimize potential effects?

No growth will occur as a result of the proposed project; therefore, no pertinent rules or measures apply.

8) If development is contingent or dependent on the project, how will it affect the environmental baseline?

No development is contingent or dependent on the proposed project. Therefore, there will be no related impacts on the environmental baseline and no effects of any kind on species or habitat.

9) If development is contingent or dependent on the project, will it have potential effects on the species?

See response to question 8.

10) If development is contingent or dependent on the project, will it have an “adverse effect” on the species or critical habitat?

See response to question 8.

Based on these findings, it is determined that the proposed project will not induce growth in the area; therefore, there will be no related indirect effects on the environment.

The removal of the deteriorating concrete rubble could result in minor improvements in water quality. BMPs such as seeding the new fill slopes will help minimize any erosion/sedimentation that could occur after project completion. Due to the decrease in pollutant concentrations and the beneficial effects associated with removal of concrete rubble within the OHWL, indirect effects are considered to be negligible.

## **10. INTERRELATED AND INTERDEPENDENT ACTIONS**

Interrelated actions are those that are part of a larger action and depend on the larger action for their justification; interdependent actions are those that have no independent utility apart from the action under consideration. The proposed project consists of replacing and existing bridge structure, it will not promote future construction or other activities that would not otherwise occur without the completion of this project. Therefore, no interrelated or interdependent actions that could affect species regulated under the ESA will occur as a result of this bridge replacement project.

## **11. CUMULATIVE EFFECTS**

Cumulative effects include the effects of future state, tribal, local, or private actions that are reasonably certain to occur in the action area. The primary action potentially affecting federally listed species is development projects without Federal funding or Federal permit requirements. Within the action area, most development will occur in areas currently in agricultural production.

Population growth is frequently the stimulus for land-use actions that result in cumulative effects. Pierce County and the cities of Fife and Puyallup are the jurisdictions most likely to experience the most development and agricultural conversion within the action area due to the available undeveloped land. Each of these jurisdictions have critical area regulations in place that are designed to minimize development impacts to wetlands, fish habitat, wildlife habitat, and other sensitive areas (Table 8).

**Table 8:  
Pierce County Sensitive Area Buffers**

<b>Sensitive Area</b>	<b>Category/Type</b>	<b>Minimum Buffer Width (feet)</b>
Wetland	I	150
Wetland	II	100
Wetland	III	50
Wetland	IV	25
Stream	F1 and F2 (habitat for critical fish species)	150
Stream	N1 (perennial or seasonal non-fish bearing w/in 0.25 mile of F1 or F2)	115
Stream	N2 (perennial or seasonal non-fish bearing not w/in 0.25 mile of F1 or F2)	65
Stream	N3 (lakes or ponds that don't support critical fish species)	35
Fish and Wildlife Habitat Areas	T&E Species, State Priority Species	100 (habitat areas) 1,000 (species point locations)

To avoid and minimize impacts to ESA-listed species from future development, Pierce County developed a Habitat Protection and Regulatory Package. The regulations contain a new critical fish and wildlife chapter which adds additional species and habitat types to be regulated, a new habitat assessment process, and standards for development within critical fish and wildlife habitat areas. The required buffers for riparian areas were changed to a fish and non-fish system. Required buffer distances along riparian areas, lakes, ponds, and Puget Sound marine waters have generally been increased based upon best available science on the functions and values of elements within these environments. Incorporated areas of Pierce County (Fife, Milton, Puyallup, Edgewood, and Tacoma) have critical areas ordinances in place that provide protection to wetlands, streams, and other sensitive areas.

Mitigation is required for unavoidable impacts to these regulated features. Although development impacts are often allowed if unavoidable, the implementation of impact minimization measures is required. Preparation of a habitat management plan may be required for activities that occur within 100 feet of a habitat area, or within 1,000 feet of a point location.

## **12.0 BENEFICIAL EFFECTS**

In-water construction activities will include the removal of existing concrete rubble and creosote treated piles. Some benefit to water quality is expected to result from the removal of the deteriorating concrete rubble. There are several old creosote-treated piles within the project

limits. Creosote-treated wood placed in-water is known to leach. Creosote contains over 300 compounds, including numerous variances of polycyclic aromatic hydrocarbons (PAH). Some variants of PAHs are known to be very toxic to fish and they tend to bioconcentrate (NMFS, 1998).

Stormwater from this surface will not directly discharge to the Puyallup River. All runoff will receive treatment and flow control. The project will meet the 2008 Hydraulic Runoff Manual criteria for post-project condition. Stormwater associated with highway runoff may contain low levels of cadmium, lead, chromium, and PAH compounds. Often, these compounds are at or below levels that can be detected with current analytical methods and will be effectively filtered or settled out in stormwater BMPs such as infiltration. WSDOT will avoid the effects of increases in pollutant loading (i.e. TSS, total copper, and zinc) by minimizing the amount of new impervious surface post-project and ensuring that 100% of highway runoff is infiltrated and will not directly enter the Puyallup River. This will ensure that there will be no-net increase in stormwater pollutant concentrations of TSS, total and dissolved copper, and total and dissolved zinc.

The Puyallup River Bridge replacement project will also include flow control treatment. Increases in stream peak flows resulting from increased impervious area can negatively affect fish. Peak flows and sustained high flows in streams during storm events can cause harm or kill fish. Harm typically occurs when fish or other aquatic species are unable to get out of high flow areas and are swept downstream or battered against rocks or streambanks. In urbanized streams where little to no refugia habitat exists and where storm events can cause rapid rises in stream levels, peak or sustained high flows can be especially detrimental to fish. Rerouting of existing stormwater into the new stormwater system will result in additional water quantity improvements. Negative effects from an increase in impervious surface on stream hydrology will be avoided. No negative effects to stream base flows are likely to occur. The overall amount of impervious surface resulting from the project will be completely infiltrated.

### 13. CONCLUSIONS & EFFECT DETERMINATIONS

Based on site visits conducted by the WSDOT biologist, evaluation of the proposed activities, review of pertinent literature, implementation of conservation measures and the occurrence of species addressed, this project warrants effect determinations of “may affect, likely to adversely affect” for coastal/Puget Sound bull trout, Puget Sound Chinook, and Puget Sound steelhead. Effect determinations for species and critical habitat are shown in Table 9.

**Table 9: Effect Determinations for Listed, Designated, Proposed Species/Critical Habitat**

Species/Critical Habitat	Scientific Name	Effect Determination
Coastal/Puget Sound Bull Trout	<i>Salvelinus confluentus</i>	May affect, likely to adversely affect
Coastal/Puget Sound Bull Trout Critical Habitat	-	May affect, likely to adversely affect
Puget Sound Chinook	<i>Onchorhynchus tshawytscha</i>	May affect, likely to adversely affect
Puget Sound Chinook Critical Habitat	-	May affect, likely to adversely affect
Puget Sound Steelhead	<i>Onchorhynchus. mykiss</i>	May affect, likely to adversely affect
Pacific Eulachon		Will not jeopardize the continued existence

### **13.1 COASTAL/PUGET SOUND BULL TROUT, PUGET SOUND CHINOOK, AND PUGET SOUND STEELHEAD**

This project “may affect” coastal/Puget Sound bull trout, Puget Sound Chinook and Puget Sound steelhead in the Puyallup River because:

- The Puyallup River supports significant populations of bull trout, Chinook, and steelhead; and
- The proposed bridge replacement will require in-water work.

This project “is likely to adversely affect” bull trout, Chinook, and steelhead because:

- In-water work including work area dewatering within the Puyallup River, which is likely to cause a temporary reduction in prey species (invertebrates) and may result in harm and behavioral disruption (reduced foraging) to the species;
- Bull trout, Chinook, and steelhead may be present during removal of the existing pier/concrete rubble, potentially injuring or crushing juveniles during concrete movement;
- Bull trout, Chinook, and steelhead occur in the Puyallup River throughout the year and volitional fish relocation and possibly seining and electrofishing will be necessary;
- The project will alter aquatic habitat conditions in the action area; and
- The project will temporarily impact water quality by increasing turbidity.

### **13.2 COASTAL-PUGET SOUND BULL TROUT AND PUGET SOUND CHINOOK CRITICAL HABITAT**

The project “may affect” bull trout and Chinook critical habitat because:

- The action area is within designated critical habitat for the Coastal-Puget Sound bull trout DPS, and the Puget Sound Chinook ESU;

The project is “likely to adversely affect” designated critical habitat because:

- The project will temporarily impact water quality by increasing turbidity;
- Critical habitat will be temporarily dewatered, impacting prey species (invertebrates);
- Puyallup River gravel substrates will be heavily disturbed by in-water work; and
- Migratory corridors will be temporarily degraded by the placement of in-water structures and in-water work.

The proposed project will have mixed effects on the condition of bull trout and Chinook habitat indicators over the long term. All indicators will be maintained at existing conditions at the watershed scale. At the action area scale, most indicators will be maintained at existing conditions. Some indicators (i.e. water quality) will be improved as a result of the project. Other

indicators (pool quality, pool frequency, refugia, width/depth ratio, and riparian reserves) will be degraded at the action area scale.

### 13.3 PACIFIC EULACHON

The project “*will not jeopardize the continued existence*” of proposed Pacific eulachon because:

- Impacts on migrating spawning adults will not be sufficient to preclude both the survival and recovery of the ESU as a whole:
- Baseline conditions of the river will be maintained: and
- However, if Pacific eulachon becomes listed prior to completion of the project, a provisional effect determination is provided below.

The project “*may affect*” Pacific eulachon because:

- In-water work will occur within Puyallup River; and
- The Puyallup River is considered migration and spawning habitat.

The project “*is not likely to adversely affect*” Pacific eulachon because:

- If adult eulachon are migrating through or spawning within the action area, it will be outside of the in-water work window. In-water construction will not be occurring during the migration and /or spawn timing; and
- Pacific eulachon occurrence in the Puyallup River is currently documented as “*rare*” (Gustafson *et al.* 2008).

## 14.0 ESSENTIAL FISH HABITAT

The project action area includes essential fish habitat for Chinook, coho (*O. kisutch*), and pink salmon (*O. gorbuscha*). The proposed project will have an “*adverse affect*” on essential fish habitat for these species, based on the same criteria used in evaluating effects on bull trout, Chinook, and steelhead individuals and habitat. A detailed evaluation of the effects of the proposed project on essential fish habitat for these species, as well as the justification for determination of “*no adverse effect*” on groundfish and coastal pelagic essential fish habitats is provided in Appendix L.

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